






**Wisconsin Explorers** Kids ages 9 + up



yellow jacket

# DISCOVERING SECRETS



WOOD VIOLET  
Wisconsin's  
State Flower



American toad



field cricket



flicker feather



raccoon track

cicada nymph



trap door spider

\_\_\_\_\_ YOUR NAME

\_\_\_\_\_ DATE

\_\_\_\_\_ NAME OF PARK

# HAVE FUN! EXPLORE! COLLECT A PATCH!

Look at all these things you can do. Pick something and do it!

- ☐ Flash a code to a firefly (page 3).
- ☐ Fool a cricket (page 4).
- ☐ Search for insects “talking” (page 5).
- ☐ Detect puzzling patterns (page 7).
- ☐ Find numb3rs in n8ture (pages 8-9).
- ☐ Expose the secret identities of birds (pages 10-12).
- ☐ Explore the moon (page 14).
- ☐ Watch the moon’s phases (page 16).
- ☐ Untangle the mysteries of spiders (page 17).
- ☐ Witness Wisconsin’s wonders (pages 20-23; at least one list).
- ☐ Find the hidden animals (page 24).
- ☐ Hide yourself at your campsite (page 25).
- ☐ Read a milkweed plant (page 26).
- ☐ Look at lichens (page 27).

## TO EARN A PATCH:

- ☐ Complete 7 to 14 of the explorations listed above.
- ☐ Attend a nature program or take a nature hike.
- ☐ Pick up litter, share nature discoveries, or ride a bike and walk more (see page 27).
- ☐ Fill out the evaluation form with a grown-up (found on colored insert of this booklet).

## TO RECEIVE YOUR PATCH (CHOOSE ONE METHOD):

- ☐ Give your evaluation to a park staff person and tell him/her what you did.
- ☐ Visit the Wisconsin Explorers Web site <[www.dnr.wi.gov/org/land/parks/interp/we](http://www.dnr.wi.gov/org/land/parks/interp/we)> and complete the evaluation form. The patch will arrive by mail in 2-4 weeks.
- ☐ Mail the evaluation form, your address, and a letter or journal entry telling about your explorations to: Wisconsin Explorers Program PR/6, Department of Natural Resources, P.O. Box 7921, Madison, WI 53707. The patch will arrive by mail in 2-4 weeks.

**FOR MORE INFORMATION, CALL (608) 266-2181  
OR EMAIL [WIPARKS@WI.GOV](mailto:WIPARKS@WI.GOV)**

The Wisconsin Explorers program is an interpretive program of the Wisconsin State Park System made possible by the generous support of the Natural Resources Foundation of Wisconsin and the following donors: Bong Naturalist Association, Friends of Devil’s Lake State Park, Friends of Hartman Creek State Park, Friends of Interstate Park, Friends of Kettle Moraine, Inc., Friends of Kohler Andrae State Park, Friends of New Glarus Woods State Park, Friends of Rock Island State Park, Friends of Whitefish Dunes State Park, Menasha Corporation Foundation, R.D. & Linda Peters Foundation, and one very generous anonymous donor.



# CRACK THE CODE

If you've been around pets, you know that animals communicate. Dogs sniff each other, birds sing, cats rub, and guinea pigs *wheek*. Insects communicate, too. They use sounds, touches, chemicals, and visual clues to recognize other insects, defend their territories, and attract mates.

Insect communication isn't always easy to understand, because sometimes insects communicate in secret codes. Try reading this sentence:

**Nscts hv t cmmnct. Frfls flash lghts, crckts mk chrpng snds, nd stnk bgs smll bd.**

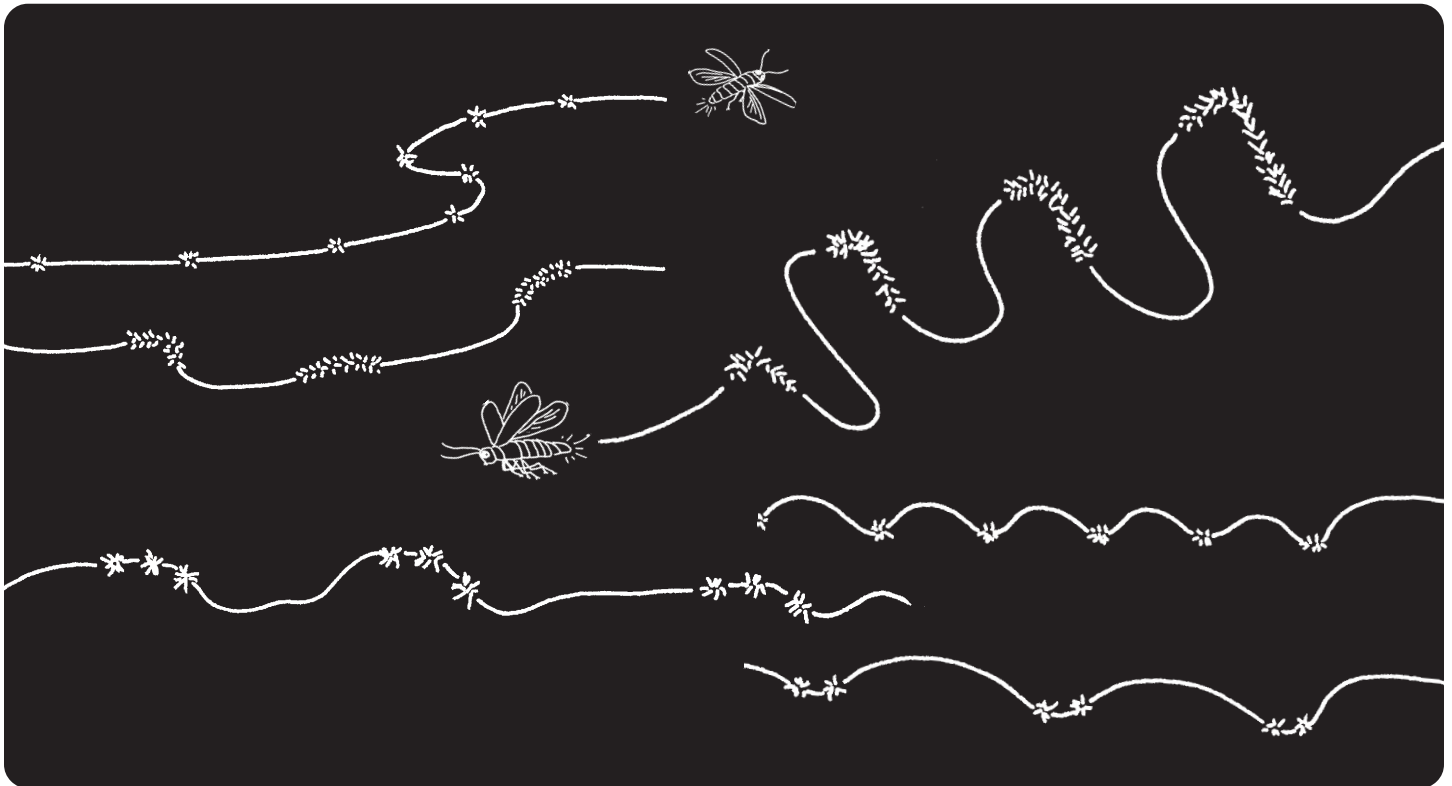
Once you figure out the code, it's not that hard. (Hint: something is missing.)

Read ahead to start exploring the ways fireflies (this page) and crickets (page 4) talk to each other.

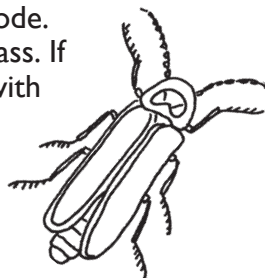
## FLASH A CODE

Get a small flashlight (an LED is perfect). Go to a tall grass meadow or forest near water at dusk. Watch the fireflies *talk* for a while before you try to join. Can you find any of the flash patterns shown below?

Different species of fireflies have different flash codes. The codes differ by color, length of flash, pattern, speed, and time between flashes.

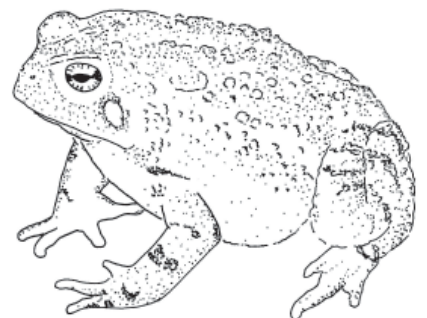


Males are flying; females are on the ground. It might be more fun to "fly" around and pretend to be a male, but it will be more interesting to sit in the tall grass and be a female. Watch a female in the grass, then imitate her flash code. Point your light down into the grass. If your light is too bright, cover it with a leaf. If you are really good (and lucky), a male firefly will land on your flashlight!



## THINK ABOUT IT!

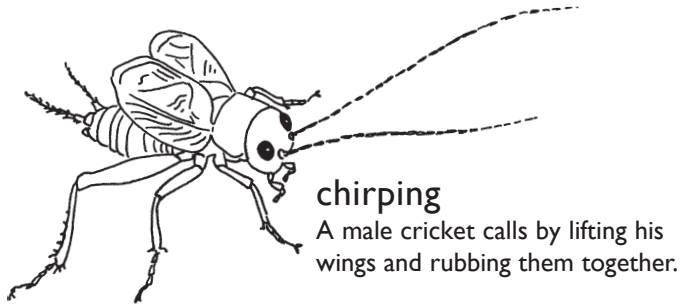
If a toad ate a lot of fireflies, would it glow?



# FOOL A CRICKET

To fool a cricket, you will need to *speak* cricket. You can:

- ◆ Open and close a hinge or something that makes a high-pitched squeak.
- ◆ Whistle a cricket sound by sucking in short bursts of air while letting your throat vibrate (like you're snoring).
- ◆ Play a flute or recorder so it sounds like a cricket.
- ◆ Rub a file against the edge of a metal can, or rub your fingernail down the teeth of a comb.



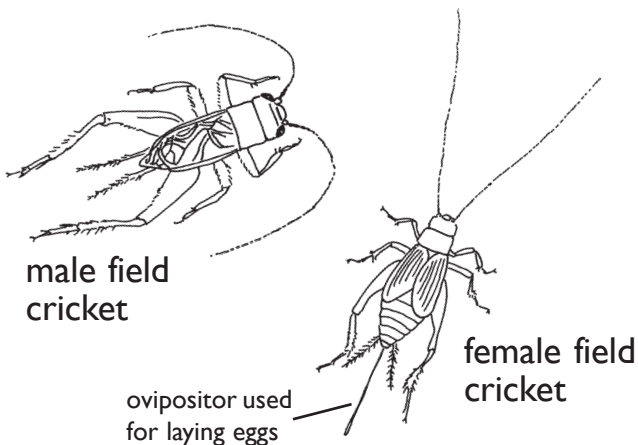
## chirping

A male cricket calls by lifting his wings and rubbing them together.

Find some crickets calling. Field crickets usually call from grassy places both day and night. Tree crickets usually start calling from trees and shrubs after dark. As you approach, they will stop. Sit down and don't move. How long does it take for them to start calling again? Make a small noise and they stop. Now try your cricket call. Do they answer? Keep adjusting your call until it works.

While you are listening, you might notice that some male crickets make three kinds of calls:

- ◆ Calling song - fairly loud; attracts females and tells other males to stay away.
- ◆ Aggressive chirp - loud; warns nearby males to get out of its territory.
- ◆ Courting song - quiet; invites nearby females to mate.



male field cricket

female field cricket

ovipositor used for laying eggs

Tell the story. Did you fool a cricket?

## FIND OUT MORE


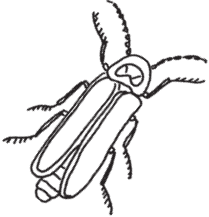

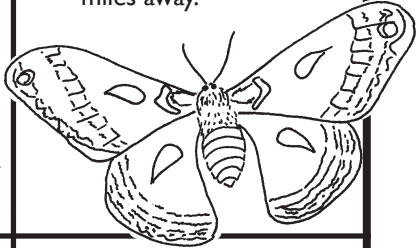


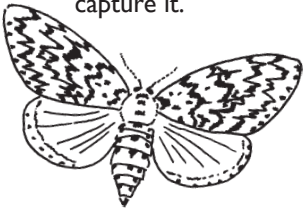



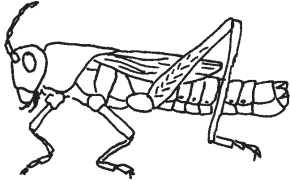
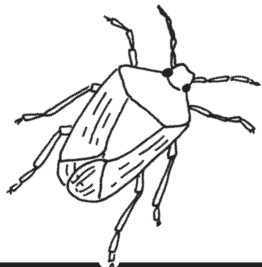

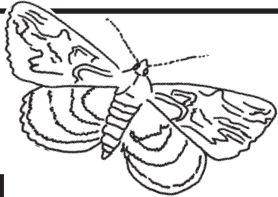
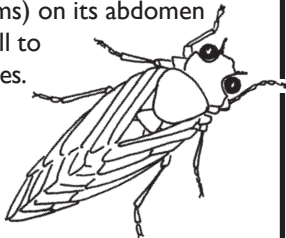
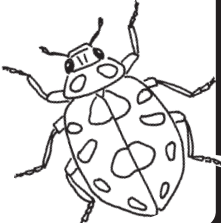
To hear recordings of insects, visit **Music of Nature** <[www.musicofnature.com](http://www.musicofnature.com)> or **Singing Insects of North America** <<http://buzz.ifas.ufl.edu/>>

To learn a different way to make cricket sounds, check out the book **MouthSounds** by Fred Newman.



# SEARCH FOR INSECTS "TALKING"

Fireflies use visual communication (light), and crickets use sound. Other insects rely on touch or chemicals to communicate. As you explore forests, meadows, and wetlands, look for the insects on this page. Check them off as you find them. Can you find four in a row, four in a column, all four corners, or all of them?

TOUCH	VISUAL	SOUND	CHEMICAL
<input type="checkbox"/> <b>ant</b> Identifies other ants by touching them with its antennae. 	 <input type="checkbox"/> <b>firefly</b> Flashes light signals to find a mate.	<input type="checkbox"/> <b>mosquito</b> Buzzes wings to annoy people (not really, but it seems that way). 	<input type="checkbox"/> <b>cecropia moth</b> (female) Releases strong odor (pheromone) that attracts males from miles away. 
<input type="checkbox"/> <b>mole cricket</b> (mother) Recognizes her young in their underground home by touching them with her antennae. 	 <input type="checkbox"/> <b>bumblebee</b> Uses yellow and black colors to warn predators of its stinger.	<input type="checkbox"/> <b>tiger moth</b> Makes high-pitched sounds that confuse bats trying to capture it. 	<input type="checkbox"/> <b>swallowtail caterpillar</b> Sticks a stinky forked scent gland (osmeterium) out of its head when attacked. 
 <input type="checkbox"/> <b>honeybee</b> Shows other bees how to find nectar by dancing in the dark hive while the other bees touch it.	<input type="checkbox"/> <b>dragonfly</b> Displays bright metallic colors to attract a mate. 	 <input type="checkbox"/> <b>grasshopper</b> (male) Rubs its leg against its wing to make raspy sounds—telling other males to stay out of its territory.	<input type="checkbox"/> <b>stink bug</b> Gives off a strong smell when threatened. 
<input type="checkbox"/> <b>whirligig beetle</b> Feels the ripples on the water made by other whirligigs as they all swim in tight circles. 	 <input type="checkbox"/> <b>underwing moth</b> Spreads its wings to reveal bright underwings and large eyespots—scaring off predators.	<input type="checkbox"/> <b>cicada</b> (male) Vibrates tymbals (drums) on its abdomen to call to females. 	<input type="checkbox"/> <b>ladybird beetle</b> Oozes smelly liquid from its legs when attacked. 

Insects aren't the only animals to communicate by secret codes. Long before the Internet or cell phones were imagined, people all over the world talked to each other using Morse code. You can communicate with Morse code by using a flashlight, tapping on someone's hand, or even blinking your eyes.

- ◆ The alphabet is made up of dots and dashes.
- ◆ One dash is equal to three dots. That means a dash should last as long as the time it would take to signal three dots.
- ◆ Between letters, pause for the time of three dots.
- ◆ Between words, pause for the time of seven dots.

<b>A</b> ..	<b>B</b> -...	<b>C</b> -...-
<b>D</b> -..	<b>E</b> .	<b>F</b> ...-
<b>G</b> ---	<b>H</b> ....	<b>I</b> ..
<b>J</b> .---	<b>K</b> --	<b>L</b> ...-
<b>M</b> --	<b>N</b> -.	<b>O</b> ---
<b>P</b> ....	<b>Q</b> ---	<b>R</b> ...
<b>S</b> ...	<b>T</b> -	<b>U</b> ..-
<b>V</b> ...-	<b>W</b> .--	<b>X</b> ...-
<b>Y</b> ----	<b>Z</b> ---	

What has 6 legs, bites, and talks in code?

• —      — —      — — —      • — •      • • •      •      — — • —      • • —      • •      —      — — —

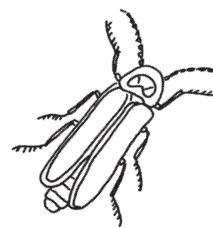
## Why do bees hum?

• • — •   — — —   • — •   — — •   — — —   —   —   • • • •   •   • — —   — — —   • — •   — • • • •

## What goes “zzub, zzub, zzub”?

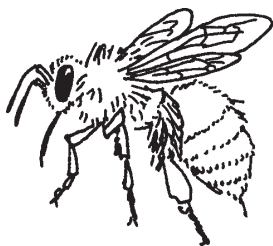
— 000   0   0   00—0   0—00   —0—0   00   —0   —0—0   —000   0—   —0—0   —0—   0—0   0—   0—0   —00   000

What did one firefly say to the other?

[illegible]

Of course bees *buzz*. But if you spoke a different language, bees might not *buzz*...

German	<i>summ summ</i>
Greek	<i>zoom zoom</i>
Swedish	<i>buzz buzz</i>
Japanese	<i>boon boon</i>
Hungarian	<i>bzzz</i>
Italian	<i>zzzz</i>
Russian	<i>zh-zh-zh</i>
Spanish	<i>bzzz</i>
Turkish	<i>vizzz</i>



I cracked the insect communication code by ...

- ☐ Flashing a code to fireflies.
- ☐ Fooling a cricket.
- ☐ Searching for insects “talking.”

# DETECT PUZZLING PATTERNS

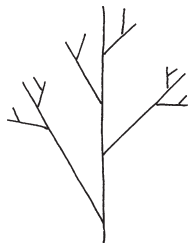
From tree rings to turtle shells, nature's patterns are both beautiful and perplexing. Why do things form patterns as they grow? Is there a secret? Is their growth predictable?

## LOOK FOR DESIGNS IN NATURE

Walk around the campground, visit the nature center, or hike through the park looking for patterns. Did you find any of the patterns described on this page? Write about or draw pictures of the patterns in the boxes below.

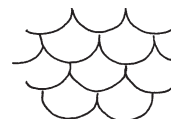
### branching patterns

As living things grow, they may branch out. Look at the arrangements of leaves on a twig. Check out lightning bolts and bark beetle carvings.



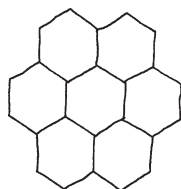
### overlapping patterns

Animals depend on their body coverings to protect them from wind, rain, and cold. Look for overlapping patterns on fish, birds, and reptiles.



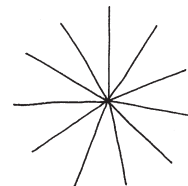
### compact patterns

Nature tries to make the best use of space. Look for tight-fitting patterns in honeycombs, flower seedheads, and pine cones.



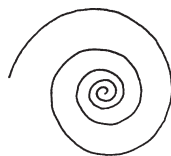
### exploding patterns

You can find patterns that reach out in many directions by looking at seedheads, mushroom gills, conifer needles, and rosettes (like dandelions).



### spiral patterns

Look for snail shells, galaxies, sunflower seedheads, spiderwebs, and curled up millipedes.



### \_\_\_\_\_ patterns

Draw pictures or describe other patterns you see.

# FINDING NUMB3RS IN N8TURE

Some of the patterns you find in nature are more than just artistic and perplexing. Some patterns seem to follow mathematical equations. If you go looking for numb3rs in n8ture, you will find them! Take Fibonacci (FEE buh NAW chee) numbers, for example.

In the Fibonacci sequence, each number after the first two is the sum of the previous two numbers.

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, . . .

Start looking for these numbers in nature, and you will find a whole new way to explore the outdoors.

## COUNT FLOWER PETALS

Count the number of petals on 5 to 10 different flowers. Track your numbers in these boxes.

Circle the Fibonacci numbers. Did Fibonacci numbers show up more often than you expected?


Sketch flowers with different numbers of petals.  
Remember to take care of all wildflowers. Sketch, don't pick!

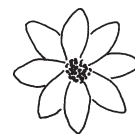


**3 petals**  
iris, lily, trillium

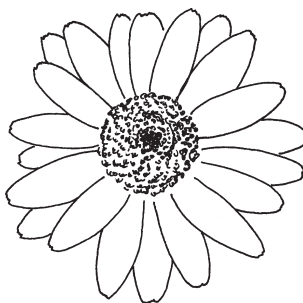


**5 petals**  
violet, buttercup,  
rose, columbine,  
milkweed

**8 petals**  
coreopsis,  
delphinium



**13 petals**  
marigold



**21 petals**  
black-eyed susan,  
chicory, aster

**34, 55, or 89 petals**  
plantains, daisies, asters,  
sunflowers

Draw flowers you found with 4, 6, 7, or 9 petals. These are **not** Fibonacci numbers.



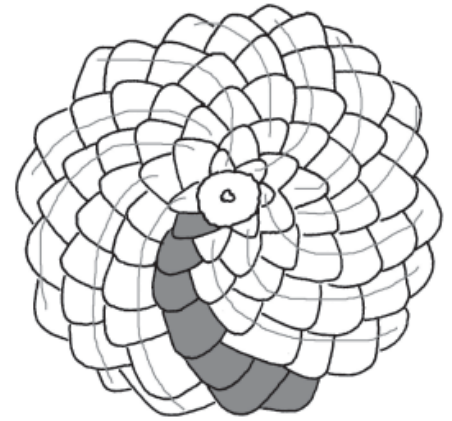
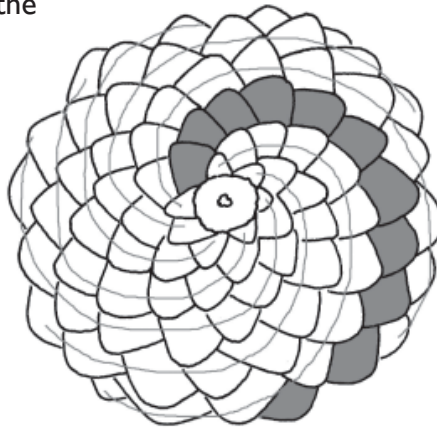


## CHECK OUT SPIRALS

Fibonacci numbers also show up in the number of spirals found on seedheads (like sunflowers) and pine cones.

Find a pine cone and look at it from the bottom.

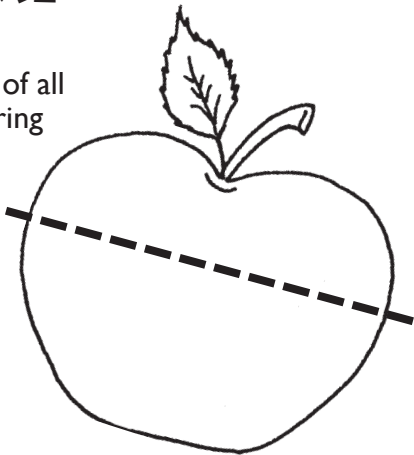
Count the number of spirals going from the center of the cone (where it attached to the tree) to the outside edge. Count the spirals in both directions. The resulting numbers are usually two consecutive Fibonacci numbers. In the example shown, there are 8 clockwise spirals and 13 counter-clockwise spirals. Can you find a pine cone that doesn't follow this pattern?



## EAT SOME FRUIT

Do the flowers of all edible fruit-bearing plants have five petals?

Cut an apple in half through the middle. What do you see? Surprised?



I searched and counted. I think Fibonacci numbers are . . .

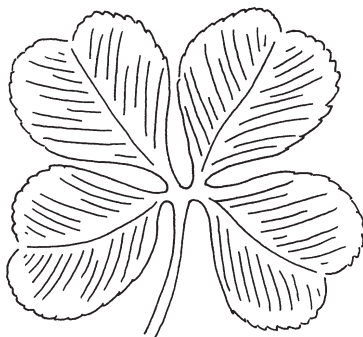
- ☐ Absolutely amazing!
- ☐ A bizarre coincidence that is WAY overrated.

## THINK ABOUT IT!

Nature is complicated. If you look long enough you can find exceptions to every rule.

Just spend some time looking for a four-leaf clover. You know that most clovers have three leaves. However, if you are patient and lucky, you will find a four-leaf clover.

The same is true of other patterns in nature. If you look long enough, you will find a plant or animal that breaks the rules. It might have too many petals, grow too tall, or be the *wrong* color. That's what makes nature so exciting. No matter how much you see, there is always something new to explore.



I detected puzzling patterns by . . .

- ☐ Looking for designs in nature.
- ☐ Counting flower petals.
- ☐ Checking out the spiral patterns on pine cones.
- ☐ Looking at apples and other edible fruits.
- ☐ Eating pineapple and asparagus after counting the spirals!

## FIND OUT MORE

*By Nature's Design* by Pat Murphy

If you like math and want to learn more, visit **Fibonacci Numbers and the Golden Section** (Professor Ron Knott's Web page)

[www.mcs.surrey.ac.uk/Personal/R.Knott/Fibonacci/](http://www.mcs.surrey.ac.uk/Personal/R.Knott/Fibonacci/)

# EXPOSE THE SECRET IDENTITIES OF BIRDS

Hey, what just flew by? Did it look like a bird you have seen before? What color was it? How big was it? Did it have stripes or spots? As you learn to identify common birds, you'll get better at noticing these details, but first you have to get close enough to see them. . .

## FIND A BIRD

You've heard that the early bird gets the worm. It's also true that the early birder (birdwatcher) sees the bird. Most birds are active in the early morning as they look for breakfast. Move slowly, talk softly, wear earth-colored clothes, walk with the sun at your back, and look for a place to sit down and watch. Remember to give the birds space. Watch from a distance and don't disturb nests or nesting birds.

### FIELD NOTES

When you find birds, use these tricks to get them to come closer. Don't overuse these tricks. During nesting season, cold spells, extreme heat, and droughts, birds must use all their energy to survive. They don't need a birdwatcher distracting them from finding food and avoiding predators.

#### Try the 'kiss' method

You're not really kissing them! You are imitating the sounds birds make when they are in trouble. Sometimes birds come close to see what's up. When you kiss for birds:

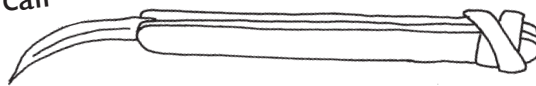
- Make the squeaky part of the kiss. Don't let your lips "pop."
- Try kissing different parts of your hand to make different sounds. Start with a soft sound by kissing the knuckles of your fist. If that doesn't work try the back of your hand. To make the loudest sound, kiss the palm of your hand.
- Try to sound like a small bird chirping or a rodent squeaking.
- Make each squeak three to five seconds long. Wait at least a minute before squeaking again.

#### Pish

If you're not excited about kissing your hand, try pishing. With your teeth together, gently blow air out. While you blow, open and close your lips. You can make the "pish" sound soft or loud by adjusting the amount of air you blow. You can change the pitch by making your lips tight or loose.

#### Make a homemade bird call

Take two popsicle sticks, a wide piece of grass, and a rubber band. Put the grass between the popsicle sticks. Wrap the rubber band around one end. Blow on the side of the call like a harmonica. You might have to separate the popsicle sticks just a little.



I exposed the secret identities of birds by . . .

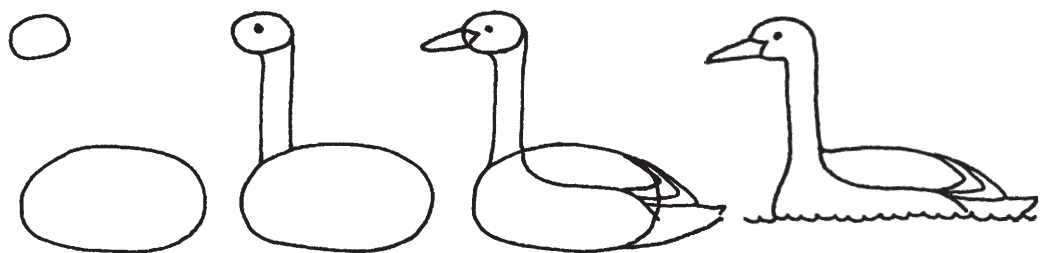
- ☐ Taking an early morning bird walk.
- ☐ Kissing or pishing for birds.
- ☐ Making a popsicle stick bird call.
- ☐ Sketching an unfamiliar bird.
- ☐ Starting a life list of the birds I've seen.

# SKETCH A BIRD

When you see a bird you've never seen before, watch it closely. Note all the things mentioned in the FIELD NOTES on page 12. Draw and label a picture of the bird. Make notes about its colors and markings so you can color it later. Write down what the bird was doing.



Birds' bodies are drawn around two ovals. The ovals change size and position based on the type of bird. Look at the examples, then start sketching.



## FIELD NOTES

**Look at the bird, not at the book!**

If you are fortunate enough to have a field guide to birds, try not to use it right away. You'll learn more about birds by watching and sketching them first. Ask yourself these questions:

**How big is it?**

Is the bird small like a chickadee, medium-sized like a robin, or large like a crow?

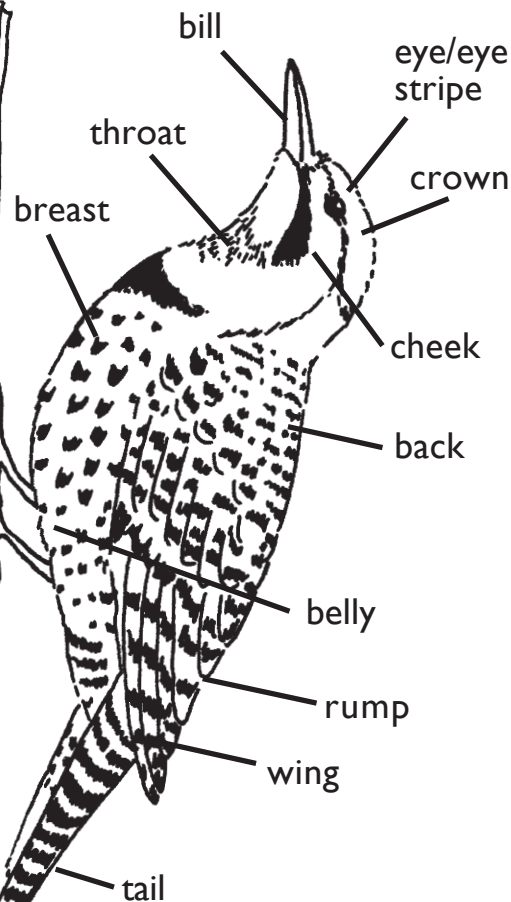
**What are its field marks?**

Birders know that the colors, stripes, and other field marks on a bird will help them identify it. Start at the head and work toward the tail. Ask yourself these questions and remember the answers:

- Does the bird have stripes on its head? Around the eyes? What color is the crown of its head?
- Is the bill short or long? Thin or thick?
- Is the bird's breast plain or streaked? What color is it?
- Do the wings have bars? Are the wingtips a different color?
- Is the tail long or short? Does it fork? Are there bars across the tail?

**What is it doing?**

Is the bird wading in water? Walking up a tree trunk? Does it bob its tail up and down? Is it alone or in a flock?



## START A LIFE LIST

Birders keep track of all the birds they have ever seen. Start your list with these birds. They are found all over Wisconsin, but it might not be easy to find all of them in one summer.

Bird	Date & place I saw it	Bird	Date & place I saw it
<input type="checkbox"/> Canada goose	_____	<input type="checkbox"/> American robin	_____
<input type="checkbox"/> Mallard	_____	<input type="checkbox"/> European starling *	_____
<input type="checkbox"/> Great blue heron	_____	<input type="checkbox"/> Yellow warbler	_____
<input type="checkbox"/> Turkey vulture	_____	<input type="checkbox"/> Common yellowthroat	_____
<input type="checkbox"/> Red-tailed hawk	_____	<input type="checkbox"/> Song sparrow	_____
<input type="checkbox"/> Great horned owl	_____	<input type="checkbox"/> Northern cardinal	_____
<input type="checkbox"/> Mourning dove	_____	<input type="checkbox"/> Red-winged blackbird	_____
<input type="checkbox"/> Blue jay	_____	<input type="checkbox"/> Common grackle	_____
<input type="checkbox"/> American crow	_____	<input type="checkbox"/> Brown-headed cowbird	_____
<input type="checkbox"/> Tree swallow	_____	<input type="checkbox"/> American goldfinch	_____
<input type="checkbox"/> Black-capped chickadee	_____	<input type="checkbox"/> House sparrow *	_____

\* These birds are not native to Wisconsin.

## SPOT RARER BIRDS

If you want a challenge, try spotting some of these birds. Scientists put these birds on the Species of Greatest Conservation Need (SGCN) list because their populations are low or declining. To find these birds you will have to be at the right place (habitat) at the right time. They are not impossible to find, but they aren't listed as SGCN for nothing!

Bird	Date & place I saw it	Bird	Date & place I saw it
<input type="checkbox"/> Trumpeter swan	_____	<input type="checkbox"/> Red-headed woodpecker	_____
<input type="checkbox"/> American black duck	_____	<input type="checkbox"/> Wood thrush	_____
<input type="checkbox"/> Osprey	_____	<input type="checkbox"/> Hooded warbler	_____
<input type="checkbox"/> Northern harrier	_____	<input type="checkbox"/> Field sparrow	_____
<input type="checkbox"/> Solitary sandpiper	_____	<input type="checkbox"/> Eastern meadowlark	_____
<input type="checkbox"/> Whip-poor-will	_____		

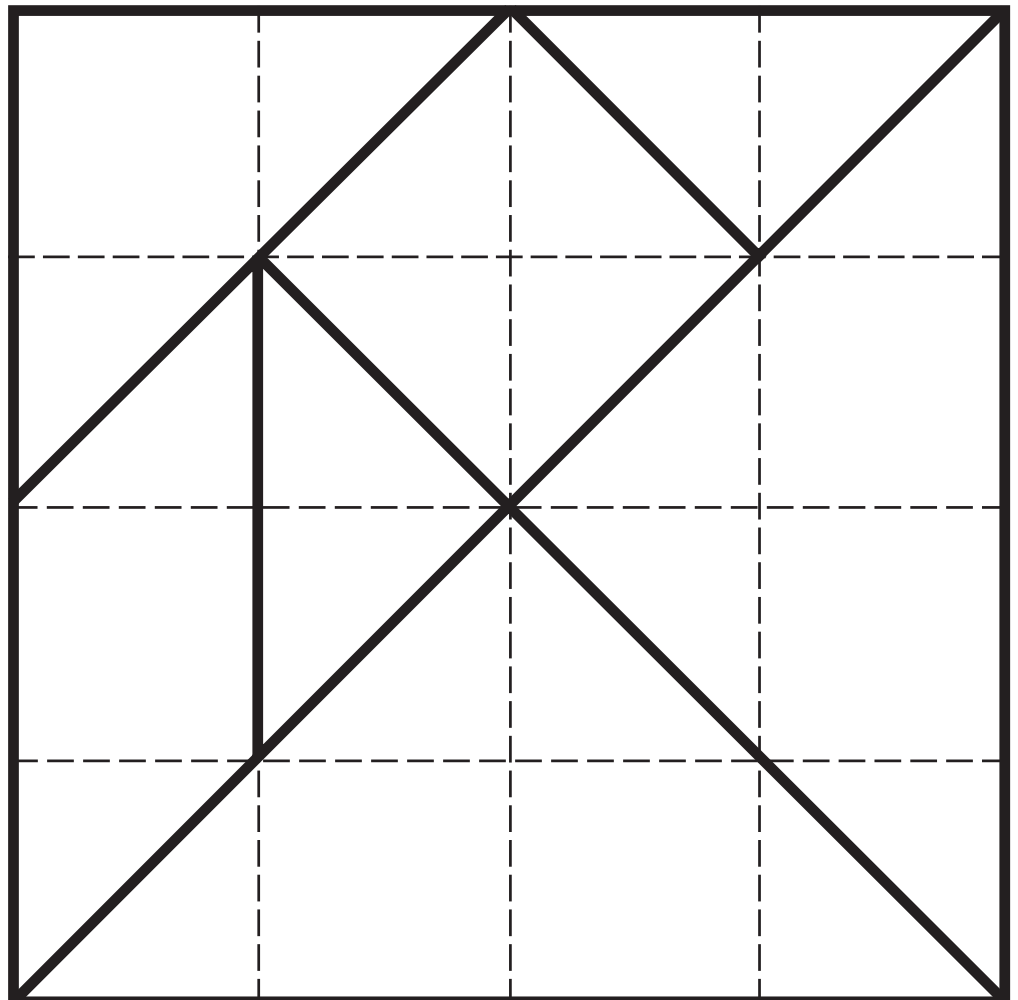
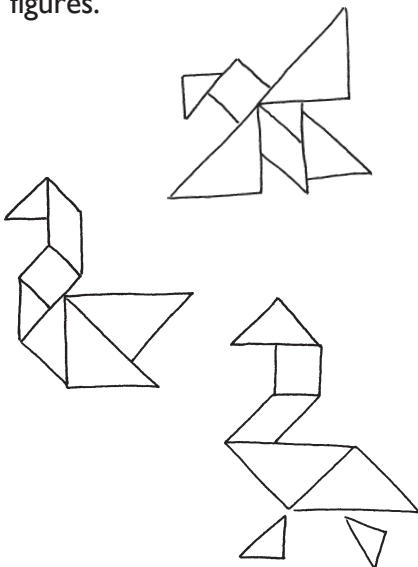
## FIND OUT MORE

If you start finding a lot of birds that aren't on the lists above, you need a better list. Ask for a bird checklist at the park you are visiting. Some parks even have field guides you can look at or borrow. When you return home, visit **Great Wisconsin Birding and Nature Trail** for a statewide checklist <[www.dnr.state.wi.us/org/land/er/birds/trail.htm](http://www.dnr.state.wi.us/org/land/er/birds/trail.htm)>

To learn about bird songs, check out **Bird Calls** by Frank Gallo. To read some African folktales, try **When Birds Could Talk and Bats Could Sing** by Virginia Hamilton. For relaxing music, listen to **Songbird Symphony**, by NorthWord Press. To find out about John James Audubon, read **The Boy Who Drew Birds** by Jacqueline Davies.

## SOLVE A PUZZLE

A tangram is an ancient Chinese puzzle. Copy or trace the square on the right onto a piece of paper. Cut out along the solid lines. Arrange the pieces to make the birds shown here and many other amazing figures.





# EXPLORE THE MOON

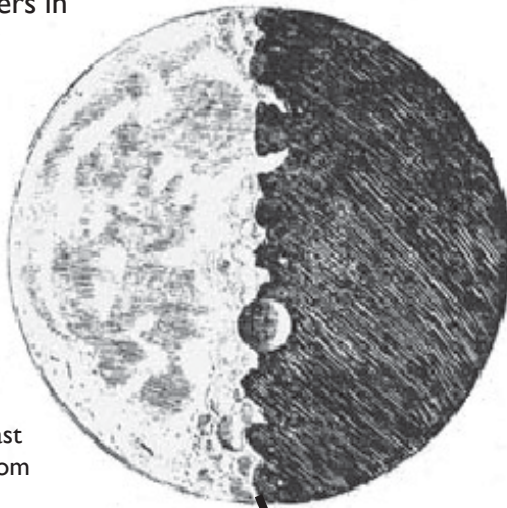
In our world of streetlights, nightlights, headlights, and spotlights, we hardly notice the moon anymore. It's fun to get away from the lights while you are camping and take some time to explore the moon!

## CHECK OUT OLD AND NEW ROCK

The moon's surface is made up of bright and dark splotches. The bright areas are places where the moon's ancient crust still exists. The dark splotches are places where lava has erupted from inside the moon, flowed over the surface, and formed newer rock. People once thought these dark areas were seas.

## LOCATE THE TERMINATOR

Before, during, and after the quarter phases, the sun's rays hit the moon's surface at an angle and make long shadows. This is a good time to look at craters in the terminator (the line that separates the lit and unlit sides of the moon).



Galileo Galilei's drawing of the last quarter moon from the 1600s.

terminator

I explored the moon and saw...

- |  |  |
|--|--|
| <input type="checkbox"/> Craters         | <input type="checkbox"/> Tycho           |
| <input type="checkbox"/> Seas            | <input type="checkbox"/> Earthshine      |
| <input type="checkbox"/> Rays            | <input type="checkbox"/> The terminator! |
| <input type="checkbox"/> Sea of Serenity | <input type="checkbox"/> Ancient rocks   |

## OBSERVE EARTHSHINE

Look for the crescent moon near the horizon at sunset. Can you see the ghostly shape of the full moon? Leonardo DaVinci was the first one to realize that this glow was caused by earthshine (sunlight reflected off of the earth onto the unlit portion of the moon).



Leonardo DaVinci's drawing of earthshine from the 1500s.

## DISCOVER CRATERS

If you have good eyesight and a clear night, you can see the moon's craters. A pair of binoculars lets you see smaller craters and craters inside craters, formed when meteoroids, asteroids, and comets hit the moon.

When the moon is full and looks like a flat disk, it is a good time to look at the rays that radiate from craters. The most recent craters are surrounded by bright rays created when powdered rock blasted outward from the impact. Over time, more things will hit the moon and work this powder back into the moon's surface. In the photo on the next page, Tycho, Aristarchis, and Copernicus are young craters.

## FIND OUT MORE

*Dot to Dot in the Sky: Stories of the Moon* by Joan Marie Galat

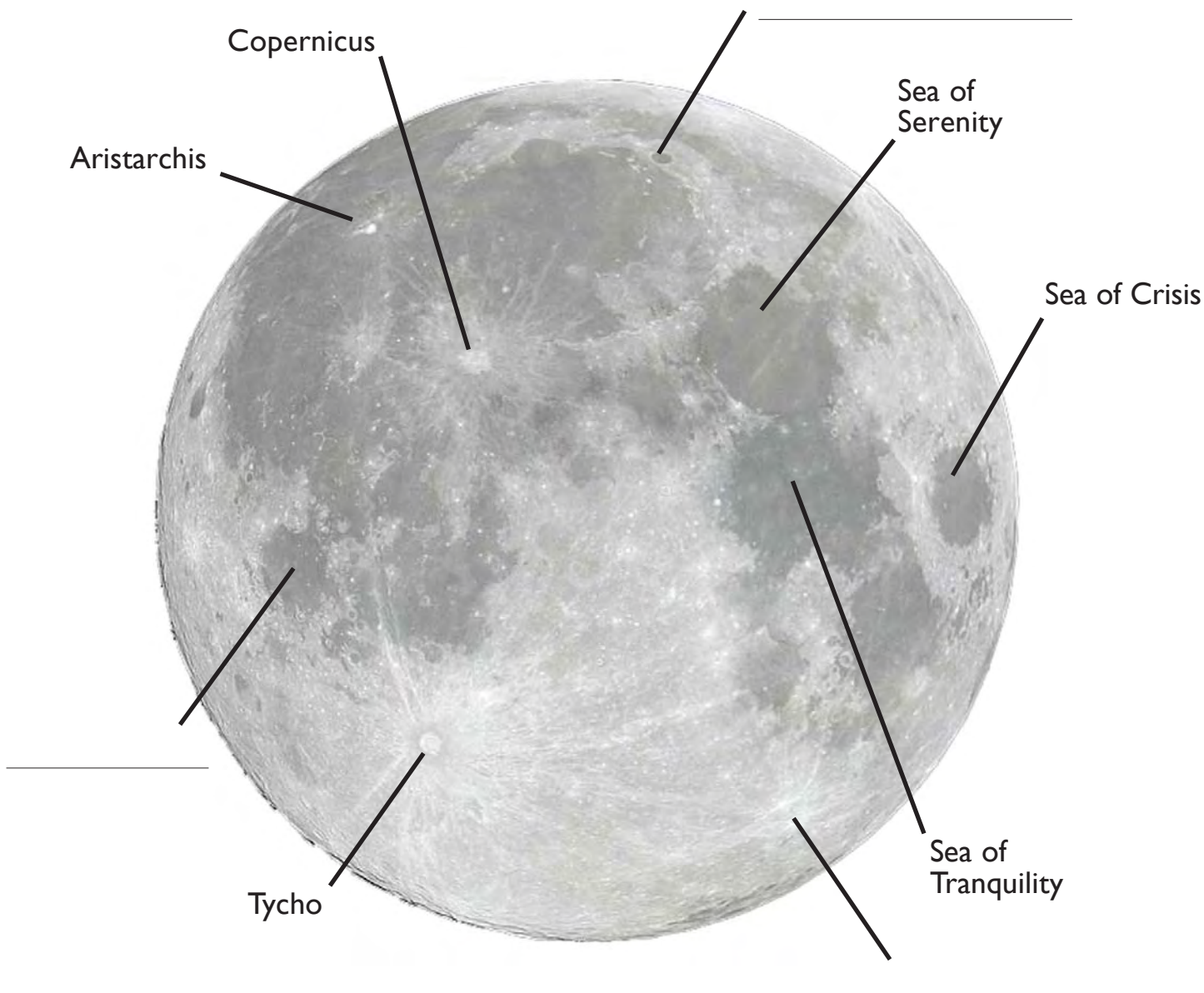
*How the Moon Regained Her Shape* by Janet Ruth Heller

Check out space online at **Astronomy for Kids** <kidsastronomy.com>











# NAME THAT CRATER

Scientists named almost every nook, cranny, crater, and “sea” for somebody or something. They named craters after famous scientists and seas after weather events or states of mind. But don’t let that stop your creativity! What if you were in charge of naming things on the moon? Who would you honor? What shapes and designs do you see? Find a place where you can see the moon and finish naming the landmarks on this photo. A few lines have been added to get you started.



# WATCH THE MOON

It shouldn't take a detective to find the moon. You just have to know where and when to look. The moon always rises in the east, follows the path of the sun, and sets in the west. Watch for one month. Can you find each of these phases?

Phase	Looks like	When and where to look	Date you saw it
New Moon		Rises at sunrise and sets at sunset.	(Can't see it)
Waxing Crescent		Rises in the morning and sets in the evening.	
First Quarter		Rises around noon, is high in the sky at sunset, sets around midnight.	
Waxing Gibbous		Rises in the afternoon, is high in the sky in the evening, sets before dawn.	
Full Moon		Rises at sunset and sets at sunrise.	
Waning Gibbous		Rises in the evening and sets in the morning.	
Last Quarter		Rises around midnight and sets around noon.	
Waning Crescent		Rises between midnight and sunrise and sets in the afternoon.	

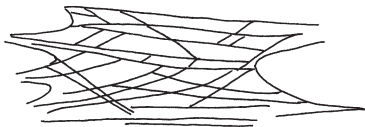
I watched the moon for a whole month. The thing that amazed me the most was ...

# UNTANGLE THE MYSTERIES OF SPIDERS

Why don't spiders get caught in their own webs? How does a spider with poor eyesight catch anything? Do all spiders spin webs? Can you say, "Wise spiders will weave webs wonderfully well," five times really fast? Try some of the suggestions on this page to untangle a few mysteries.

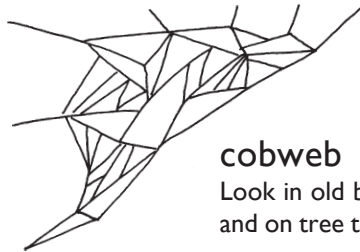
## FIND A WEB

Webs are easier to find in the morning when they are covered with dew. Webs also show up better in the morning and evening because the sun isn't right overhead. Different kinds of spiders spin different kinds of webs.



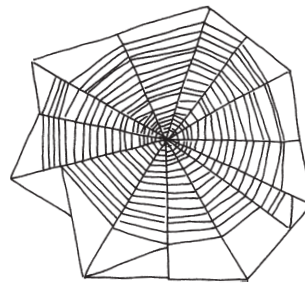
**sheet web**

Look in the grass.



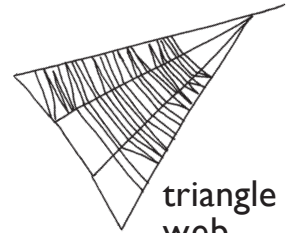
**cobweb**

Look in old buildings and on tree trunks.



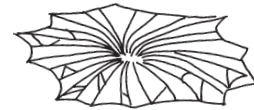
**orb web**

Look in tall grass and woods.



**triangle web**

Look in trees.



**funnel web**

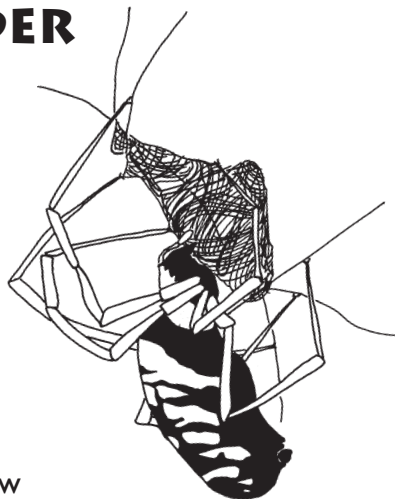
Look in rock piles and firewood.

## TRICK A SPIDER

Can you fool a spider into thinking that an insect is caught in its web? Take a piece of grass and gently touch the web. Either vibrate the grass gently or roll it between your fingers. Wiggle the web for a few seconds, then rest for a few seconds. Repeat. If you do it just right, the spider will come charging from its hiding place. If it doesn't work the first time, try again with a different web.

## FEED A SPIDER

Find a large web that looks new. Capture an insect like a grasshopper or cricket. Place the insect in the sticky spirals of the web. Step back and watch what happens. Does the spider inject the insect with venom from its fangs? Does it wrap the insect with silk? How long does it take?

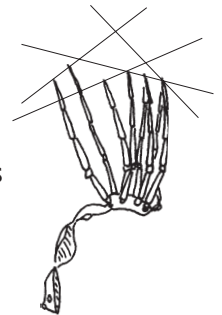


## GO ON A NIGHTTIME SPIDER SAFARI

Grab a flashlight and a grownup and head outside after dark. Go far away from bright lights. Put the end of the flashlight on your forehead - right between your eyes. Start looking around in the grass and bushes for tiny sparkling lights. Those "lights" are spider eyes reflecting the light of your flashlight. Be sure to shine the light straight out from your head. Don't move the flashlight - move your whole head. Or use a headlamp!

## FIND A SPIDER SHED

To grow bigger, a spider must shed its exoskeleton (hard outside covering). Every time it molts (sheds its skin), it leaves behind an empty skin. Can you find one?



## READ ABOUT SPIDERS

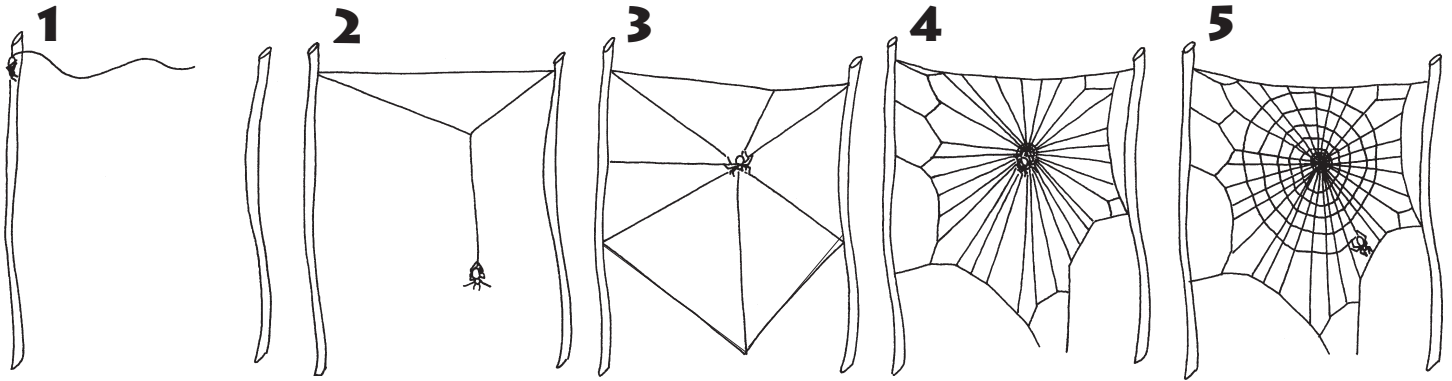
*Anansi the Spider* by Gerald McDermott

*Charlotte's Web* by E.B. White

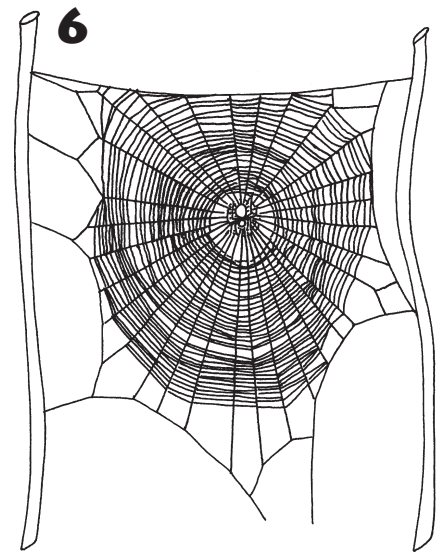
*The Spider and the Fly* by Mary Howitt

# SPIN A WEB

Can you spin an orb web? The size of your web depends on what materials you can scrounge. Find sticks, poles, or trees for supports. Use thread, yarn, shoestrings, or rope for silk. Take it apart after you show it to someone.

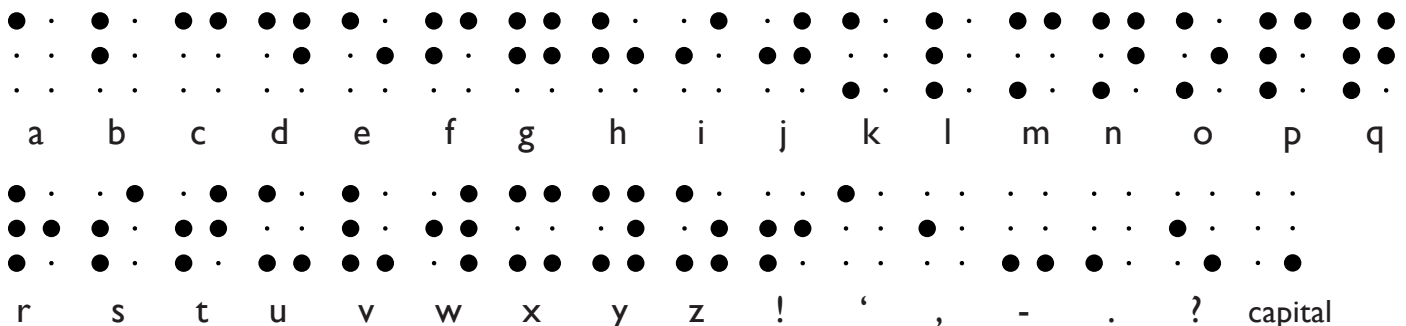


- 1** The spider spins out a piece of silk that the breeze carries to a nearby support.
- 2** The spider strengthens this line by laying down more silk on top of it. Then she drops down on a piece of silk to form three rays.
- 3** The spider adds the main frame of the web and more rays.
- 4** The spider continues to add rays until the distance between the rays is small enough to cross.
- 5** Starting in the center, the spider lays down a temporary non-sticky spiral.
- 6** When it reaches the outside of the web, the spider turns around and follows the non-sticky spiral back to the center. As it goes, it eats the temporary spiral and lays down a sticky spiral.



## SOLVE A PUZZLE

Except for hunting spiders (like wolf spiders and jumping spiders), most spiders don't depend on their eyesight to find and capture prey. Solve this puzzle written in Braille to find out how they find food. For an extra challenge, turn the paper over and press the back of each bold dot with a pen or pencil to make a raised bump. Can you solve the puzzle with your fingers?



# WEAVE A STORY

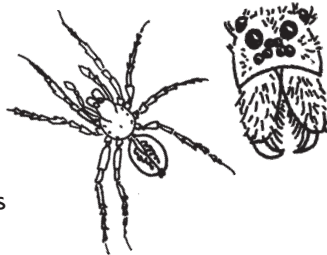
Use drawings and words to tell about the spiders and webs you found.

## FIELD NOTES

Not all spiders build webs to capture their prey. Here are three web-less hunters you might find at the park.

### wolf spiders

These common spiders are large. Look for them walking around during the day. They have two large eyes, and their legs are a little hairy.



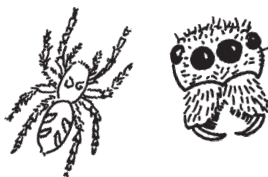
### crab spiders

These spiders can walk backwards, forwards, or sideways - just like a crab. Look for them hiding in flowers.



### jumping spiders

They can really jump! Sometimes their small bodies are brightly colored. They have large eyes.



I untangled the mysteries of spiders by ...

- ☐ Finding at least one web-making spider and one hunting spider.
- ☐ Searching for spider eyes after dark.
- ☐ Feeding a spider.
- ☐ Sketching or building a spider web.



# WITNESS WISCONSIN'S (NOT SO) SECRET WONDERS

The Seven Ancient Wonders of the World were truly amazing. How many can your family name?

It would be great to see those amazing things, but impossible, since most were destroyed or disappeared long ago. Wouldn't it be nice to have a list of wonderful things that you might actually be able to see in one summer or at least in a lifetime?

Wisconsin is full of amazing places and natural wonders. Some are very familiar like the Wisconsin Dells and Door County. Others are well-kept secrets. Here are some lists of things that you and your family can discover together. Pick a list and start enjoying Wisconsin's Wonders! When you find something, check it off and write down when and/or where you saw it.

## WISCONSIN'S HISTORIC WONDERS

Visit these state parks and forests to see some of Wisconsin's archeological sites and historical

structures listed on the *National Register of Historic Places*.



- ☐ **Aztalan State Park**<sup>1</sup> \_\_\_\_\_  
also a National Historic Landmark  
Prehistoric village stockade
- ☐ **Brule River State Forest**<sup>4</sup> \_\_\_\_\_  
Brule-St. Croix portage
- ☐ **Copper Culture State Park**<sup>3</sup> \_\_\_\_\_  
Prehistoric burial grounds
- ☐ **High Cliff State Park**<sup>6</sup> \_\_\_\_\_  
Effigy mounds
- ☐ **Peninsula State Park**<sup>8</sup> \_\_\_\_\_  
Eagle Bluff Lighthouse
- ☐ **Point Beach State Forest**<sup>5</sup> \_\_\_\_\_  
Rawley Point Light Station
- ☐ **Roche-a-Cri State Park**<sup>9</sup> \_\_\_\_\_  
Prehistoric petroglyphs
- ☐ **Rock Island State Park**<sup>2</sup> \_\_\_\_\_  
Thordarson Estate  
Prehistoric and historic campsites
- ☐ **Tower Hill State Park**<sup>10</sup> \_\_\_\_\_  
Lead shot tower
- ☐ **Wyalusing State Park**<sup>7</sup> \_\_\_\_\_  
Effigy mounds

**Seven Ancient Wonders of the World**

Pyramids of Egypt, Hanging Gardens of Babylon (destroyed by earthquakes), Statue of Zeus at Olympia (disappeared with no trace), Temple of Artemis (destroyed in AD 262), Mausoleum at Halicarnassus (some remains in a museum), Colossus at Rhodes (destroyed in 224 BC earthquake), Pharos of Alexandria (destroyed in 13<sup>th</sup> century earthquake).

## WISCONSIN'S CCC WONDERS

From 1935 to 1942, the Civilian Conservation Corps (CCC) hired young men to revitalize America's forests. They built rustic buildings, stone steps, retaining walls, towers, and other park facilities. You can still find and enjoy evidence of their hard work at these state parks that served as CCC camps:



- ☐ **Copper Falls State Park**<sup>11</sup> \_\_\_\_\_
- ☐ **Devil's Lake State Park**<sup>12</sup> \_\_\_\_\_
- ☐ **Interstate State Park**<sup>13</sup> \_\_\_\_\_
- ☐ **Pattison State Park**<sup>14</sup> \_\_\_\_\_
- ☐ **Peninsula State Park**<sup>8</sup> \_\_\_\_\_
- ☐ **Perrot State Park**<sup>15</sup> \_\_\_\_\_
- ☐ **Rib Mountain State Park**<sup>16</sup> \_\_\_\_\_
- ☐ **Wyalusing State Park**<sup>7</sup> \_\_\_\_\_



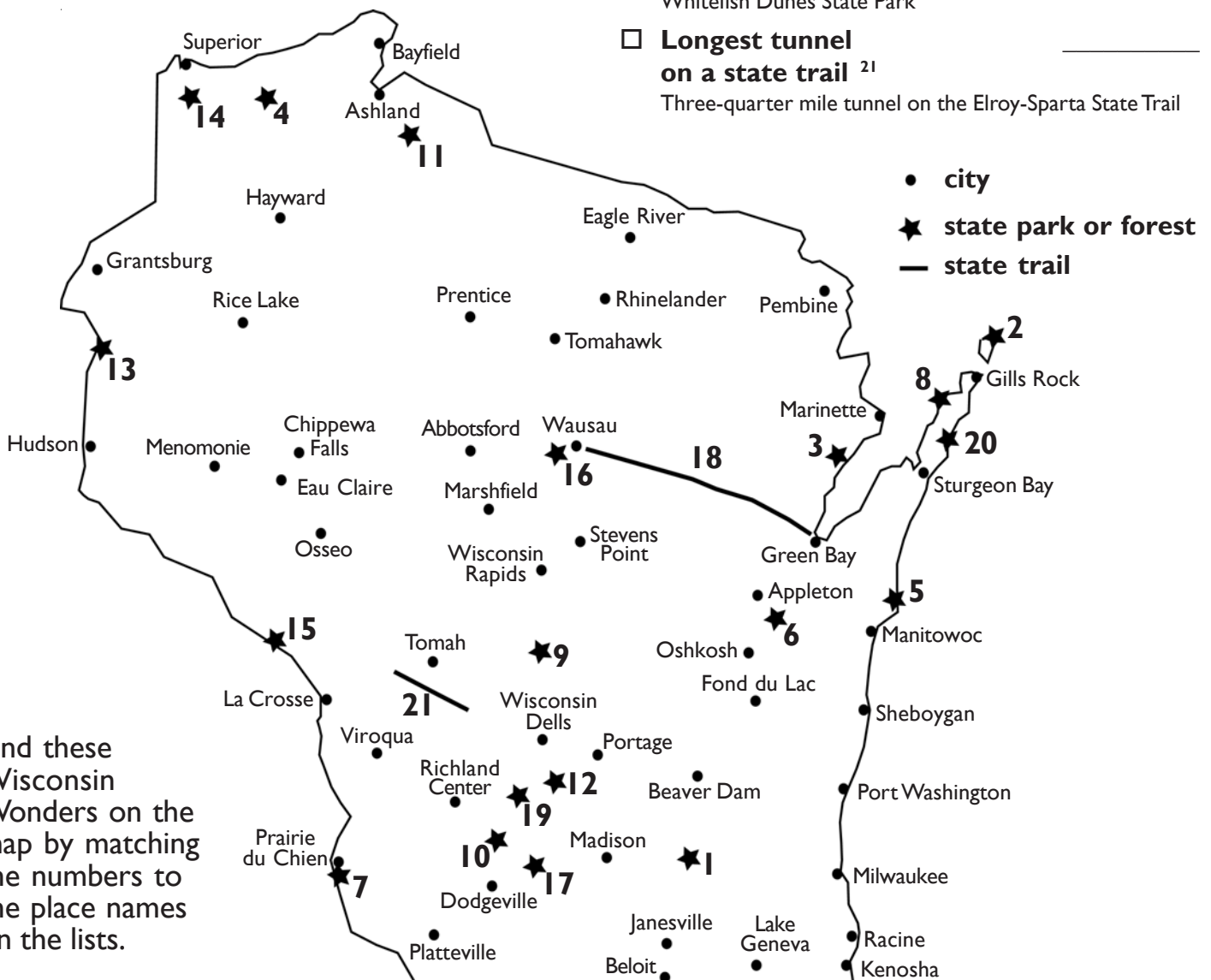
# WISCONSIN STATE PARK SYSTEM SUPERLATIVES



Visit these parks, forests, and trails to see the biggest and best that Wisconsin has to offer!

- ☐ **Highest waterfall in the state** <sup>14</sup> \_\_\_\_\_  
Big Manitou Falls at Pattison State Park
- ☐ **Oldest lighthouse in Wisconsin** <sup>2</sup> \_\_\_\_\_  
Potawatomi Lighthouse at Rock Island State Park
- ☐ **Largest state park** <sup>12</sup> \_\_\_\_\_  
Devil's Lake State Park
- ☐ **Oldest state park** <sup>13</sup> \_\_\_\_\_  
Interstate Park

- ☐ **Looks like the highest hill in the state** <sup>16</sup> \_\_\_\_\_  
Rib Mountain at Rib Mountain State Park - Timm's Hill is the highest point, but Rib Mountain stands higher above the surrounding terrain.
- ☐ **Highest point in southern Wisconsin** <sup>17</sup> \_\_\_\_\_  
Blue Mound at Blue Mound State Park
- ☐ **Longest continuous bike trail in the state** <sup>18</sup> \_\_\_\_\_  
Mountain-Bay State Trail
- ☐ **One of the oldest inhabited sites in the upper Midwest** <sup>19</sup> \_\_\_\_\_  
Raddatz rock shelter at Natural Bridge State Park
- ☐ **Longest staircase in a state park** <sup>9</sup> \_\_\_\_\_  
303-step wooden staircase at Roche-a-Cri State Park
- ☐ **Highest sand dunes in the state** <sup>20</sup> \_\_\_\_\_  
Whitefish Dunes State Park
- ☐ **Longest tunnel on a state trail** <sup>21</sup> \_\_\_\_\_  
Three-quarter mile tunnel on the Elroy-Sparta State Trail



## WISCONSIN'S SMALL WONDERS

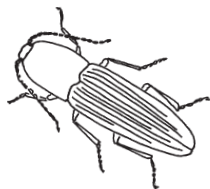
Amazing things don't have to be big. Some of the most amazing things in nature are right outside the tent flap!

### ☐ Daddy longlegs

Smell them until you find one that smells like peppermint. Does it have red spots on its legs?

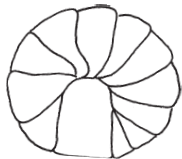
### ☐ Click beetle

Turn one upside-down on a hard surface. Does it click to turn itself upright?



### ☐ Spotless ladybird beetle

Can you find one that has just emerged from its pupal case? It won't have any spots. You can watch them darken.

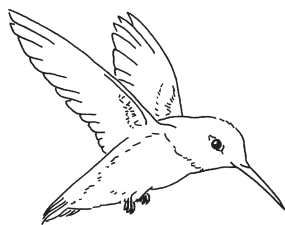


### ☐ Woodlouse (roly poly)

Among all the pill bugs under stones, can you find the ones that can roll themselves up like armadillos?

### ☐ Ruby-throated hummingbird

Listen for it! Wisconsin's smallest bird hums by fast.

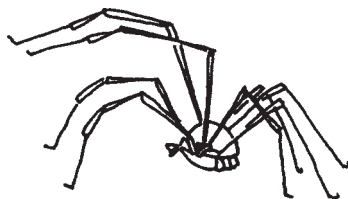
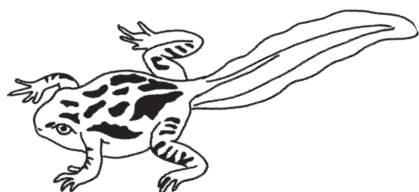


### ☐ Pygmy shrew

Look under logs and in leaf litter for an animal that is a little over 3" long (including its tail) and weighs 2 to 4 grams (same as 2 to 4 paper clips).

### ☐ Tadpole with legs

It must still have a tail to count!



## WISCONSIN'S WONDERFULLY DISGUSTING ANIMALS

How many of these stinky animals can you smell while visiting a Wisconsin State Park, Forest, Trail, or Recreation Area?



### ☐ Gartersnake

Smears an oily musk on predators (and you) when handled.

### ☐ Opossum

Oozes a nasty-smelling green mucous from its anus when playing dead.

### ☐ Stinkpot (musk turtle)

Emits a foul musk to escape predators.

### ☐ Porcupine

Releases a pungent warning odor when threatened.

### ☐ Turkey vulture

Pees on its own legs to cool down!

### ☐ Striped skunk

Sprays blinding musk in defense.

### ☐ Stink bug

Releases a smelly odor when handled.

### ☐ Multicolored Asian lady beetle

Oozes stinky fluid from its legs when stressed.

### ☐ Grasshopper

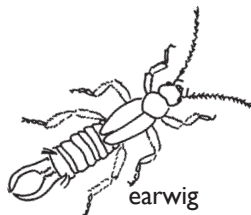
Vomits up brownish liquid when handled.

### ☐ Swallowtail caterpillar

Displays smelly "stink horns" to escape predators.

### ☐ Earwig

Squirts foul-smelling liquid when disturbed.



earwig



multicolored  
Asian lady beetle



stink bug

## LEAVE WHAT YOU FIND

When you are searching for Wisconsin's Wonders, you may find some things you would like to keep. Remember two things: first, laws protect resources on state properties; and second, Wisconsin is wonderful because it has amazing natural treasures. Leave those treasures for other kids to enjoy, too.

# SEVEN NATURAL WONDERS OF WISCONSIN

Sit down with your family or friends and make a list of your favorite outdoor places. It doesn't matter if they are popular tourist attractions or your own secret hideaways. You can list places you've been or places you want to visit. Label your favorite spots on the map on page 21.

1

5

2

6

3

7

4

I witnessed the secret (and not so secret) wonders of Wisconsin by ...

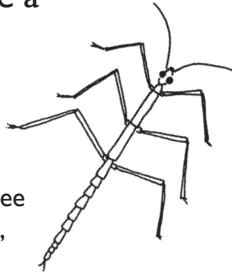
- ☐ Finding everything on one of these lists.
- ☐ Seeing at least one thing on each of the lists.
- ☐ Making a list of our favorite things.

# FIND THE HIDDEN ANIMALS

Animals hide for a lot of reasons. Prey need to hide from hungry predators. Predators need to hide so they can sneak up on prey. To find the animals, you have to know some of their secrets for hiding. Check off the secrets you uncover as you hike in the park.

## ☐ Looking like a plant

Many insects look like twigs, leaves, and thorns. Find a walking stick, tree hopper, katydid, or other insect disguised as a plant.



## Changing color

Some crab spiders change color to blend in with the flowers on which they hide. Snowshoe hares change coats with the seasons. Find a color-change animal.



## Dressing up

Caddisfly larvae hide in underwater cases that they build out of pebbles or plant parts. Find an animal that makes its hiding place.



## Displaying countershading

Animals that live in water and air are often dark above and light below. Countershading helps to hide them from predators attacking from above and below. Find a bird, frog, or fish with this pattern.



## Being transparent

What better way to hide than to be see-through like a phantom midge floating in the water? Can you find a transparent animal?



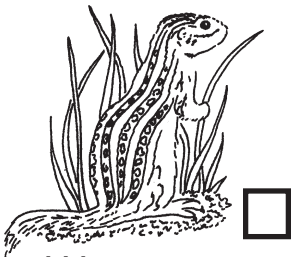
## Blending in

The colors of many animals simply match their backgrounds. Look for gray squirrels, green frogs, brown snakes, or other blenders.



## Acting

When predators are near, the American bittern (bird) points its bill up and sways with the plants. Can you find an animal that uses its behavior to hide?



## Wearing camo

Animals like the thirteen-lined ground squirrel blend in because of spots, stripes, and colors. Find an animal that is wearing camouflaged fur, feathers, or scales.

The most amazing hidden animal I found was . . .

# HIDE YOURSELF

Most of the techniques we know about good camouflage, we learned from nature. Test some of these ideas by camouflaging yourself at your campsite. Tell one adult of your plan ahead of time. How long can you remain hidden before someone finds you?

## Break up your outline

Use clothes of different colors or plants sticking out from your body to hide your human shape.

## Hide your face

Use face paint, charcoal, or mud on your forehead, nose, cheekbones, chin, and ears. Use irregular patterns. Break up the shape of your eyes with stripes.

## Reduce glare

There aren't many shiny things in nature. Be sure to hide your binoculars, eyeglasses, jewelry, or watch.

## Freeze in place

If you think you have been seen, don't even blink!

Tape a photo or make a drawing of you in your hiding place here.

# FIND ANIMALS

You can use many of the hints described on the left to help you *hunt* animals. Whether you are using a camera, binoculars, or hunting equipment, you can get closer if you. . .

## Stick to the shadows

Stay away from brightly lit meadows and forest clearings. Walk along the shaded edges.

## Stay low and watch your silhouette

Don't let your human shape be outlined against the sky.

## Watch your shadow

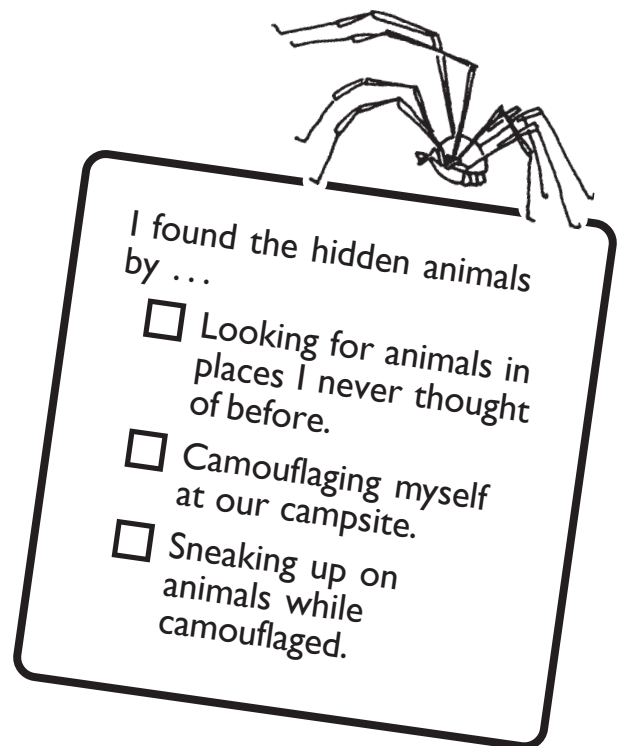
As you get close, be sure your shadow doesn't fall on the animal.

## Eliminate odor

Avoid candy, gum, perfume, fragrant shampoos, and cosmetics.

## Watch the wind

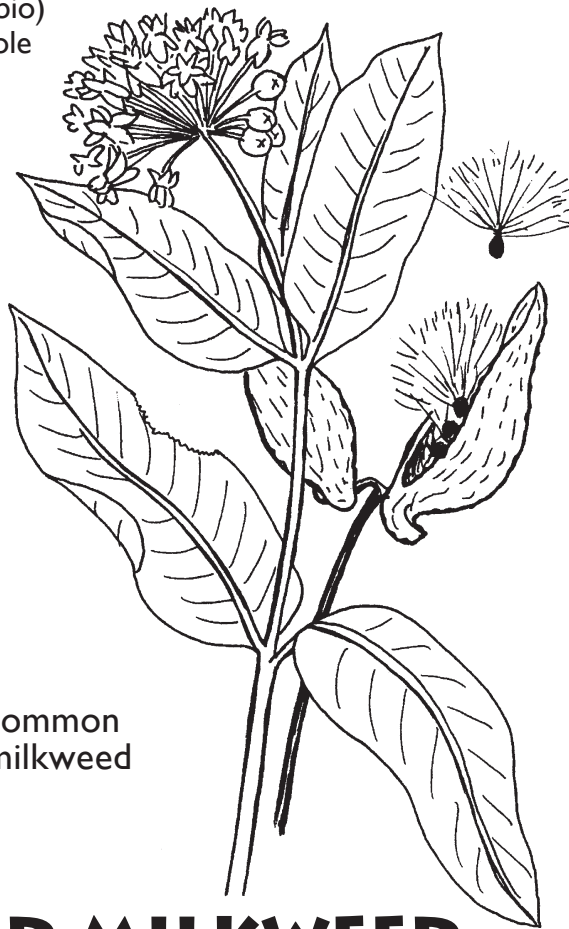
Approach an animal with the wind in your face, so that your scent is carried away from the animal.





# DECIPHER PLANT WARNINGS

Some plants and animals are extra sensitive to poor air quality, temperature changes, and chemicals in the environment. Scientists call these organisms *bioindicators* because they can be a sign of (indicate) small changes that could affect life (bio) on the whole planet.

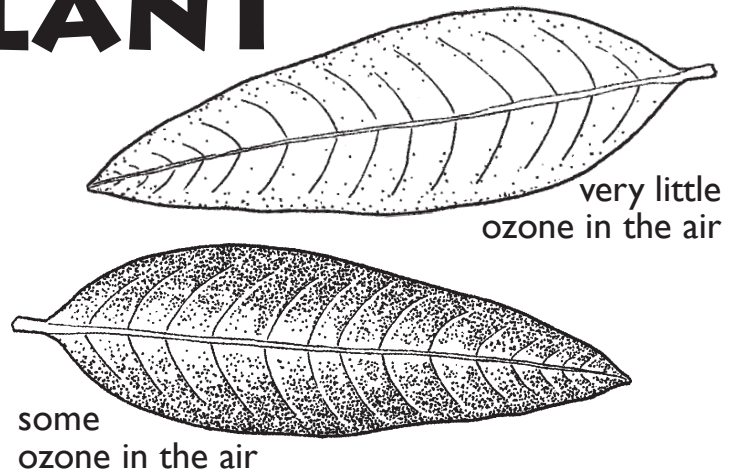


common  
milkweed

## READ MILKWEED

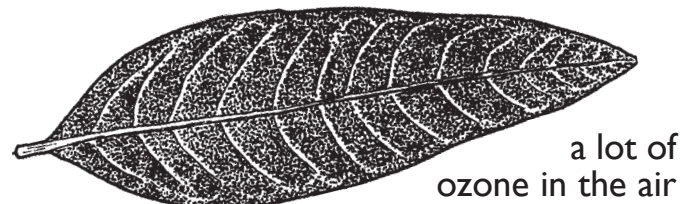
Common milkweed is a bioindicator of ozone in the air we breathe. While ozone is a good thing way up high in the atmosphere, it is a bad thing close to the ground. Bad ozone forms when pollutants from factories, gasoline engines, and paint fumes get baked in the hot summer sun.

Milkweed leaves are exposed to bad ozone 24/7. The ozone reacts with the food-producing cells on the upper surface of the milkweed leaves. It causes polka dot-like injuries. By recording the changes to sensitive plants like milkweed, scientists can monitor local air quality. Look for milkweed plants. Check leaves on several plants. Look at milkweed growing near roads. Do you expect the leaves near roads to show more or less ozone damage?



If the polka dots you found match all the characteristics below, they are probably caused by ozone damage. The dots must be:

- ☐ small like a period.
- ☐ black or dark purplish.
- ☐ only on the top of the leaves.
- ☐ missing along the veins of the leaves.



## FIND OUT MORE

For a list of things *you* can do to keep ozone levels down, visit **EEK!** <[www.dnr.wisconsin.gov/eeek/earth/air/you.htm](http://www.dnr.wisconsin.gov/eeek/earth/air/you.htm)>

Milkweed leaves and lichens are only two bioindicators. Scientists study amphibians, bacteria, aquatic insects, fish, and many other species to monitor the health of the planet. Find out how you can monitor populations and study the effects of global climate change. Visit **Citizen-based Monitoring Network of Wisconsin** <<http://cbm.wiatri.net/>> and **Journey North** <[www.learner.org/jnorth/](http://www.learner.org/jnorth/)>

I deciphered plant warnings by . . .

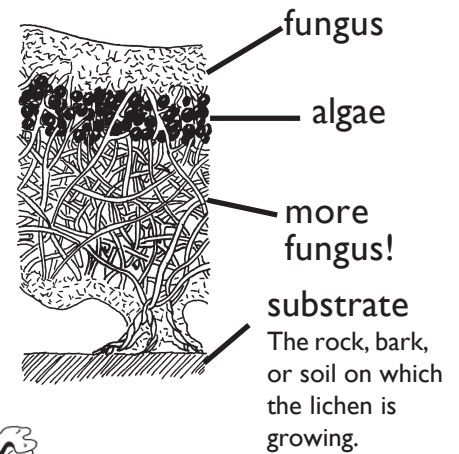
- ☐ Searching for ozone damage on milkweed leaves.
- ☐ Checking out the kinds of lichens growing at the park.



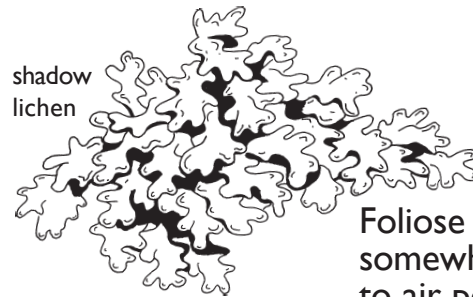
# LOOK AT LICHENS

Lichens are algae and fungi living together. The algae provide the food; the fungi provide the habitat (by catching moisture and protecting the algae from wind and sun). If you look at a cross-section of a lichen under a microscope, you can see the tiny cells of algae surrounded by fungi.

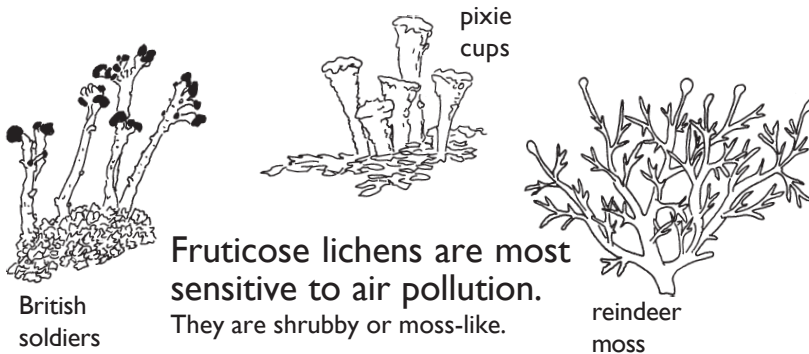
While lichens are tough and slow-growing, most are also sensitive to pollutants in the air. In the most polluted areas, you will probably not find any lichens. The kinds of lichens you find (and don't find) tell you something about the environmental health of where you are. Look for lichens on rocks, trees, and soil. If you find crustose, foliose, **and** fruticose lichens, you are probably in an area without much air pollution.



**Crustose lichens are not very sensitive to air pollution.**  
They are flat and crusty.



**Foliose lichens are somewhat sensitive to air pollution.**  
They are leaf-like.

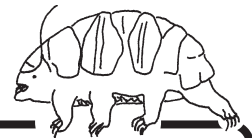


**Fruticose lichens are most sensitive to air pollution.**  
They are shrubby or moss-like.

## FIND OUT MORE!

To identify lichens, check out *Lichens of the North Woods* by Joe Walewski.

If you like lichens, you will love the water bears that often live inside them. On the Internet, go to [pathfinderscience.net](http://pathfinderscience.net) and search for tardigrades.



Draw some of the lichens you see on a hike. Give them interesting names.  
What do the lichens tell you about air pollution in the park?



# GO! GET OUT!

## GET OUTDOORS! WISCONSIN!

GET MOVING! GET ENERGIZED! GET A LITTLE DIRTY!

JUST ... GET OUT THERE AND EXPLORE!

The grown-ups in your life need you to help them stay active as they get older. Spending time exploring nature with you will help everyone's health and fitness. Look for ways to get out! How many of these activities can you do together this year?



# Get Outdoors!

- ☐ Become a Wisconsin Explorer.
- ☐ Go to a nature program.
- ☐ Hike or bike a state trail.
- ☐ Recreate at a state recreation area.
- ☐ Go camping.
- ☐ Take a bird walk.
- ☐ Snowshoe or ski through a forest.
- ☐ Find a geocache.
- ☐ Ride a horse.
- ☐ Canoe or kayak down a river.
- ☐ Go fishing.



Find out what's happening outdoors by visiting <[www.dnr.wi.gov/eek/nature/season/calendar.htm](http://www.dnr.wi.gov/eek/nature/season/calendar.htm)>

Find out about activities in the state parks by visiting <[www.dnr.wi.gov/eek/nature/camp/index.htm](http://www.dnr.wi.gov/eek/nature/camp/index.htm)>

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